

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Rec'd PCT/PTO 23 DEC 2004

PCT/JP2003/005104



Applicant's or agent's file reference PCT079JST	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP2003/005104	International filing date (day/month/year) 22 April 2003 (22.04.2003)	Priority date (day/month/year) 27 June 2002 (27.06.2002)
International Patent Classification (IPC) or national classification and IPC G01N 13/14		
Applicant JAPAN SCIENCE AND TECHNOLOGY AGENCY		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 29 August 2003 (29.08.2003)	Date of completion of this report 26 May 2004 (26.05.2004)
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP2003/005104

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
pages 1-15, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☒ the claims:
pages 1-6,10,11, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages 7,9,12,15-17, filed with the letter of 09 February 2004 (09.02.2004)
- ☒ the drawings:
pages 1-10, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☒ the claims, Nos. 8,13,14
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP03/05104

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-7, 9-12, 15-17	YES
	Claims		NO
Inventive step (IS)	Claims	1-7, 9-11	YES
	Claims	12, 15-17	NO
Industrial applicability (IA)	Claims	1-7, 9-12, 15-17	YES
	Claims		NO

2. Citations and explanations

Document 1: JP, 2001-189359, A (Toshiba Corp.), 10 July, 2001 (10.07.01) (see full text and all drawings)

Document 2: JP, 2001-236685, A (Fuji Xerox Co., Ltd.), 31 August, 2001 (31.08.01) (see full text and all drawings)

Document 3: JP, 2002-33618, A (Hitachi Cable, Ltd.), 31 January, 2002 (31.01.02) (especially see paragraph [0019] and [Fig. 1])

Document 4: JP, 11-352002, A (Mitsui Engineering & Shipbuilding Co., Ltd.), 24 December, 1999 (24.12.99) (especially see paragraphs [0011]-[0014] and [Fig. 1]).

Document 5: JP, 11-120610, A (Tokai University), 30 April, 1999 (30.04.99) (especially see [Claim 4])

The subject matter of claim 12 does not appear to involve an inventive step in view of documents 1 and 2 cited in the ISR and newly cited document 5. Document 1 teaches a light condenser comprising (1) a solid immersion lens, (2) a holder for holding a sample disposed close to the bottom face of the solid immersion lens, and (3) an XYZ-3-axis mechanical stage for controlling the position of the holder. A person skilled in the art could have easily mounted the antenna disposed on the light condensing surface of a solid immersion lens, taught by document 2, on the light condenser of document 1. Furthermore, it is a matter of course to use a solid immersion lens with a high refractive index (dielectric constant) for infrared light, when infrared light is condensed, as described in document 5.

The subject matter of claim 15 does not appear to involve an inventive step in view of documents 1 and 2 cited in the ISR and newly cited document 5. Document 2 ([Fig. 22]) describes a dipole antenna for efficiently generating near-field light. A person skilled in the art could have easily employed a dipole antenna as the antenna mounted on the light condenser of document 1.

The subject matter of claim 16 does not appear to involve an inventive step in view of documents 1, 2 and 4 cited in the ISR and newly cited document 5. The dipole antenna described in document 2 ([Fig. 22]) is triangular. Furthermore, document 4 teaches the matter that the length across an antenna is 1/2 of the wavelength.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.2

The subject matter of claim 17 does not appear to involve an inventive step in view of documents 1-4 cited in the ISR and newly cited document 5. Document 3 describes a slot antenna opposite to a vertex of a triangular window. A person skilled in the art could have easily employed a slot antenna as the antenna mounted on the light condenser of document 1.

The subject matters of claims 1-7 and 9-11 are neither described in any of the documents cited in the ISR or any of the documents newly cited in the IPER, nor obvious to a person skilled in the art.

10/519078
DT01 Rec'd PCT/PT 23 DEC 2004

AMENDMENT

To : Examiner of the patent office

February 09, 2004

1. Identification of the International Application

PCT / J P 0 3 / 0 5 1 0 4

2. Applicant

Name: Japan Science and Technology Agency

Address: 4-1-8, Hon-cho, Kawaguchi-shi,
Saitama 332-0012 JAPAN

Country of nationality: JAPAN

Country of residence: JAPAN

3. AGENT

Name: HIRAYAMA, Kazuyuki
Patent Attorney

Address: 6th Floor, Shinjukugyoen Bldg.
3-10, Shinjuku 2-chome, Shinjuku-ku,
Tokyo 160-0022 JAPAN

4. Item to be Amended

Claims

5. Details of the Amendment

(1) Specification page 17 [Claims], claim 7 (English translation pages 21 and 22, claim 7, change "An infrared light condensing apparatus characterized in that it comprises: a solid immersion lens for accepting an incident light or emitting an outgoing light; an antenna disposed on a base plane of said solid immersion lens; a holder means for retaining a specimen adjacent to said antenna; a position control means for controlling the position of said holder means, whereby operating said position control means allows: the incident light to concentrate as a near-field at a desired position of the specimen retained by said holder means or a near-field from

a desired position of the specimen to be converted into a propagating wave corresponding thereto and then the propagating wave to be emitted as said outgoing light from said solid immersion lens.” to read – An infrared light condensing apparatus characterized in that it comprises: a solid immersion lens for accepting an incident light or emitting an outgoing light; said solid immersion lens having a high refractive index in a wavelength region of infrared domain or microwave; an antenna disposed on a base plane of said solid immersion lens; a cantilever for retaining a specimen adjacent to said antenna; a position control means for controlling the position of said cantilever, whereby operating said position control means allows: the incident light to concentrate as a near-field at a desired position of the specimen retained by said cantilever or a near-field from a desired position of the specimen to be converted into a propagating wave corresponding thereto and then the propagating wave to be emitted as said outgoing light from said solid immersion lens. – .

(2) Specification page 17 [Claims], claim 8 (English translation page 22, claim 8), delete this claim.

(3) Specification page 17 [Claims], claim 9, line 6 (English translation page 22, claim 9, change “7 or claim 8” to read – 7 –.

(4) Specification page 18 [Claims], claim 12 (English translation page 23, claim 12, change “An infrared light condensing apparatus as set forth in any one of claims 7 to 11, characterized in that said holder means comprises an arm and said position control means comprises a triaxial XYZ mechanical stage.” to read – An infrared light condensing apparatus characterized in that it comprises: a solid immersion lens for accepting an incident light or emitting an outgoing light, said solid immersion lens having a high refractive index in a wavelength region of infrared or microwave; an antenna disposed on a base plane of said solid immersion lens; an arm for retaining a specimen adjacent to said antenna; a triaxial XYZ mechanical stage for controlling the position of said arm, whereby operating said triaxial XYZ mechanical stage allows: the incident light to concentrate as a near-field at a desired position of the specimen retained by said arm or a near-field from a desired position of the specimen to be converted into a propagating wave corresponding thereto and then the propagating wave to be emitted as said outgoing light from said solid

immersion lens-

(5) Specification page 18 [Claims], claim 13 (English translation page 23, claim 8), delete this claim.

(6) Specification page 18 [Claims], claim 14 (English translation page 23, claim 8), delete this claim.

(7) Specification page 18 [Claims] (English translation page 23), add claim 15 as follows: – An infrared light condensing apparatus as set forth in claim 12, characterized in that said antenna is a planar dipole antenna or a planar slot antenna disposed on a base plane of said solid immersion lens in a region of its focal position

to condense said incident light upon causing it to geometrically resonate and then to concentrate it as a near-field at said focal position or

to pick up a near-field from a position of said specimen adjacent to said focal position upon causing it to geometrically resonate and then to emit it as a wave propagating in the medium of said solid immersion lens- .

(8) Specification page 18 [Claims] (English translation page to follow page 23), add claim 16 as follows: – An infrared light condensing apparatus as set forth in claim 15, characterized in that said planar dipole antenna is a bowtie antenna made of a pair of essentially triangular electric conductors whose apexes are opposed to each other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.- .

(9) Specification page 18 [Claims] (English translation page to follow page 23), add claim 17 as follows: – An infrared light condensing apparatus as set forth in claim 15, characterized in that said planar slot antenna is a bowtie antenna made of an electric conductor having a pair of generally triangular windows formed therein whose apexes are opposed to each other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.- .

6. List of Papers Attached:

(1) Specification, substitute sheet pages 17, 18 and 18/1 (English

translation substitute sheet pages 21 – 24.

and then to emit it as a wave propagating in the medium of said solid immersion lens.

4. An infrared light condensing apparatus as set forth in any one of claims 1 to 3, characterized in that the tip of said probe is a sharply pointed edge of a rod-like electric conductor having a radius of curvature less than a diffraction limit of said incident or outgoing light and is configured to project from said electric conductor towards said specimen

to cause the geometrically resonating incident light condensed on said antenna to concentrate as a near-field at said probe tip or to take out a near-field from a surface of said specimen.

5. An infrared light condensing apparatus as set forth in any one of claims 1 to 4, characterized in that said holder means comprises an arm and said position control means comprises a triaxial XYZ mechanical stage.

6. An infrared light condensing apparatus as set forth in any one of claims 1 to 4, characterized in that said holder means comprises a cantilever having a rear face reflecting an incident laser light and said position control means is adapted to respond to a change in angle of reflection of the laser light at the cantilever rear face for controlling the distance between said probe tip and the surface of said specimen.

7. An infrared light condensing apparatus characterized in that it comprises:

a solid immersion lens for accepting an incident light or emitting an outgoing light;

an antenna disposed on a base plane of said solid immersion lens;

a holder means for retaining a specimen adjacent to said antenna;

a position control means for controlling the position of said

holder means,

whereby operating said position control means allows:

the incident light to concentrate as a near-field at a desired position of the specimen retained by said holder means or

a near-field from a desired position of the specimen to be converted into a propagating wave corresponding thereto and then the propagating wave to be emitted as said outgoing light from said solid immersion lens.

8. An infrared light condensing apparatus as set forth in claim 7, characterized in that said solid immersion lens is composed of a medium that is low in absorption coefficient and large in dielectric constant for wavelengths of said incident or outgoing light.

9. An infrared light condensing apparatus as set forth in claim 7 or claim 8, characterized in that said antenna is a planar dipole antenna or a planar slot antenna disposed on a base plane of said solid immersion lens in a region of its focal position

to condense said incident light upon causing it to geometrically resonate and then to concentrate it as a near-field at said focal position or

to pick up a near-field from a position of said specimen adjacent to said focal position upon causing it to geometrically resonate and then to emit it as a wave propagating in the medium of said solid immersion lens.

10. An infrared light condensing apparatus as set forth in claim 9, characterized in that said planar dipole antenna is a bowtie antenna made of a pair of essentially triangular electric conductors whose apexes are opposed to each other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.

11. An infrared light condensing apparatus as set forth in

claim 9, characterized in that said planar slot antenna is a bowtie antenna made of an electric conductor having a pair of generally triangular windows formed therein whose apexes are opposed to each other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.

12. An infrared light condensing apparatus as set forth in any one of claims 7 to 11, characterized in that said holder means comprises an arm and said position control means comprises a triaxial XYZ mechanical stage.

13. An infrared light condensing apparatus as set forth in any one of claims 7 to 11, characterized in that said holder means comprises a cantilever having a rear face reflecting an incident laser light and said position control means is adapted to respond to a change in angle of reflection of the laser light at the cantilever rear face for controlling the distance between said antenna and the surface of said specimen retained by said cantilever.

14. An infrared light condensing apparatus as set forth in any one of claims 1 to 13, characterized in that said incident or outgoing light is an infrared light or microwave.

特 許 協 力 条 約

PCT

国際予備審査報告

REC'D 17 JUN 2004

WIPO

PCT

(法第12条、法施行規則第56条)
[PCT36条及びPCT規則70]

出願人又は代理人 の書類記号 PCT079JST	今後の手続きについては、国際予備審査報告の送付通知（様式PCT/ IPEA/416）を参照すること。	
国際出願番号 PCT/JPO3/05104	国際出願日 (日.月.年) 22.04.2003	優先日 (日.月.年) 27.06.2002
国際特許分類 (IPC) Int. Cl ⁷ G01N13/14		
出願人 (氏名又は名称) 独立行政法人科学技術振興機構		

1. 国際予備審査機関が作成したこの国際予備審査報告を法施行規則第57条 (PCT36条) の規定に従い送付する。

2. この国際予備審査報告は、この表紙を含めて全部で 4 ページからなる。

☒ この国際予備審査報告には、附属書類、つまり補正されて、この報告の基礎とされた及び/又はこの国際予備審査機関に対してした訂正を含む明細書、請求の範囲及び/又は図面も添付されている。
(PCT規則70.16及びPCT実施細則第607号参照)
この附属書類は、全部で 3 ページである。

3. この国際予備審査報告は、次の内容を含む。

I ☒ 国際予備審査報告の基礎

II ☐ 優先権

III ☐ 新規性、進歩性又は産業上の利用可能性についての国際予備審査報告の不作成

IV ☐ 発明の単一性の欠如

V ☒ PCT35条(2)に規定する新規性、進歩性又は産業上の利用可能性についての見解、それを裏付けるための文献及び説明

VI ☐ ある種の引用文献

VII ☐ 国際出願の不備

VIII ☐ 国際出願に対する意見

国際予備審査の請求書を受理した日 29.08.2003	国際予備審査報告を作成した日 26.05.2004	
名称及びあて先 日本国特許庁 (IPEA/JP) 郵便番号100-8915 東京都千代田区霞が関三丁目4番3号	特許庁審査官 (権限のある職員) 遠藤 孝徳 印	2 J 3 2 1 0
	電話番号 03-3581-1101 内線 3251	

様式PCT/IPEA/409 (表紙) (1998年7月)

I. 国際予備審査報告の基礎

1. この国際予備審査報告は下記の出願書類に基づいて作成された。(法第6条(PCT 14条)の規定に基づく命令に
応答するために提出された差し替え用紙は、この報告書において「出願時」とし、本報告書には添付しない。
PCT規則70.16, 70.17)

☐ 出願時の国際出願書類

☒ 明細書 第 1-15 ページ、 出願時に提出されたもの
明細書 第 _____ ページ、 国際予備審査の請求書と共に提出されたもの
明細書 第 _____ ページ、 _____ 付の書簡と共に提出されたもの

☒ 請求の範囲 第 1-6, 10, 11 項、 出願時に提出されたもの
請求の範囲 第 _____ 項、 PCT 19条の規定に基づき補正されたもの
請求の範囲 第 _____ 項、 国際予備審査の請求書と共に提出されたもの
請求の範囲 第 7, 9, 12, 15-17 項、 09.02.2004 付の書簡と共に提出されたもの

☒ 図面 第 1-10 ページ/図、 出願時に提出されたもの
図面 第 _____ ページ/図、 国際予備審査の請求書と共に提出されたもの
図面 第 _____ ページ/図、 _____ 付の書簡と共に提出されたもの

☐ 明細書の配列表の部分 第 _____ ページ、 出願時に提出されたもの
明細書の配列表の部分 第 _____ ページ、 国際予備審査の請求書と共に提出されたもの
明細書の配列表の部分 第 _____ ページ、 _____ 付の書簡と共に提出されたもの

2. 上記の出願書類の言語は、下記に示す場合を除くほか、この国際出願の言語である。

上記の書類は、下記の言語である _____ 語である。

- ☐ 国際調査のために提出されたPCT規則23.1(b)にいう翻訳文の言語
☐ PCT規則48.3(b)にいう国際公開の言語
☐ 国際予備審査のために提出されたPCT規則55.2または55.3にいう翻訳文の言語

3. この国際出願は、ヌクレオチド又はアミノ酸配列を含んでおり、次の配列表に基づき国際予備審査報告を行った。

- ☐ この国際出願に含まれる書面による配列表
☐ この国際出願と共に提出された磁気ディスクによる配列表
☐ 出願後に、この国際予備審査(または調査)機関に提出された書面による配列表
☐ 出願後に、この国際予備審査(または調査)機関に提出された磁気ディスクによる配列表
☐ 出願後に提出した書面による配列表が出願時における国際出願の開示の範囲を超える事項を含まない旨の陳述書の提出があった
☐ 書面による配列表に記載した配列と磁気ディスクによる配列表に記録した配列が同一である旨の陳述書の提出があった。

4. 補正により、下記の書類が削除された。

☐ 明細書 第 _____ ページ
☒ 請求の範囲 第 8, 13, 14 項
☐ 図面 図面の第 _____ ページ/図

5. ☐ この国際予備審査報告は、補充欄に示したように、補正が出願時における開示の範囲を越えてされたものと認められるので、その補正がされなかったものとして作成した。(PCT規則70.2(c) この補正を含む差し替え用紙は上記1.における判断の際に考慮しなければならず、本報告に添付する。)

V. 新規性、進歩性又は産業上の利用可能性についての法第12条(PCT35条(2))に定める見解、それを裏付ける文献及び説明

1. 見解

新規性 (N)	請求の範囲	1-7, 9-12, 15-17	有
	請求の範囲		無
進歩性 (I.S)	請求の範囲	1-7, 9-11	有
	請求の範囲	12, 15-17	無
産業上の利用可能性 (I.A)	請求の範囲	1-7, 9-12, 15-17	有
	請求の範囲		無

2. 文献及び説明 (PCT規則70.7)

- 文献1: JP 2001-189359 A (株式会社東芝)、
2001.07.10
(全文、全図を参照されたい。)
- 文献2: JP 2001-236685 A (富士ゼロックス株式会社)、
2001.08.31
(全文、全図を参照されたい。)
- 文献3: JP 2002-33618 A (日立電線株式会社)、
2002.01.31
(特に、段落番号【0019】、【図1】を参照されたい。)
- 文献4: JP 11-352002 A (三井造船株式会社)、
1999.12.24
(特に、段落番号【0011】～【0014】、【図1】を参照されたい。)
- 文献5: JP 11-120610 A (学校法人東海大学) 1999.04.30
(特に、【請求項4】を参照されたい。)

請求の範囲12に係る発明は、国際調査報告で引用された文献1及び文献2と新たに引用した文献5とにより進歩性を有しない。文献1には、ソリッドイマージョンレンズと、ソリッドイマージョンレンズの底面に近接して配置された試料を保持する保持具と、この保持具の位置を制御するXYZ-3軸メカニカルステージとを有した集光装置が教示されている。文献2により教示された、ソリッドイマージョンレンズの集光面に配置されたアンテナを、文献1の集光装置に搭載することは当業者にとって容易である。そして、文献5に記載されたように赤外光を集光する際には、赤外光に対して屈折率(誘電率)の高いソリッドイマージョンレンズを用いることは当然のことである。

請求の範囲15に係る発明は、国際調査報告で引用された文献1及び文献2と新たに引用した文献5とにより進歩性を有しない。文献2【図22】には、効率よく近接場光を発生させるためのダイポールアンテナが記載されている。文献1の集光装置に搭載するアンテナをダイポールアンテナとすることは当業者にとって容易である。

請求の範囲16に係る発明は、国際調査報告で引用された文献1、文献2及び文献4と新たに引用した文献5とにより進歩性を有しない。文献2【図22】に記載されたダイポールアンテナは三角形である。また、文献4にはアンテナの差し渡し長を波長の1/2にする事項が教示されている。

補充欄 (いずれかの欄の大きさが足りない場合に使用すること)

第 V.2 欄の続き

請求の範囲 1 7に係る発明は、国際調査報告で引用された文献 1 乃至文献 4 と新たに引用した文献 5 とにより進歩性を有しない。文献 3 には、三角形の窓の頂点を対向させたスロットアンテナが記載されている。文献 1 の集光装置に搭載するアンテナをスロットアンテナとすることは当業者にとって容易である。

請求の範囲 1 乃至 7、及び 9 乃至 1 1 に係る発明は、国際調査報告で列記した文献、及び国際予備審査報告で新たに引用した文献のいずれにも記載されておらず、当業者にとって自明なものではない。

5. 前記保持具がアームであり、前記位置制御手段がXYZ-3軸メカニカルステージであることを特徴とする、請求項1~4のいずれかに記載の赤外光集光装置。

6. 前記保持具がカンチレバーであり、このカンチレバーの背面に当てられたレーザー光の反射角の変化により、前記位置制御手段が前記プローブ先端と前記試料表面との距離を制御することを特徴とする、請求項1~4のいずれかに記載の赤外光集光装置。

7. (補正後) 入射光を入力するまたは出射光を出力する、赤外光領域又はマイクロ波帯域で大きな屈折率を有するソリッドイマージョンレンズと、このソリッドイマージョンレンズの底面に配設したアンテナと、このアンテナに近接して配設した試料を保持するカンチレバーと、このカンチレバーの位置を制御する位置制御手段とを有し、

上記位置制御手段を操作して、上記カンチレバーに保持した試料の所望の位置に上記入射光を近接場として集中する、または、上記試料の所望の位置からの近接場を伝搬波に変換して上記ソリッドイマージョンレンズから上記出射光として出力することを特徴とする、赤外光集光装置。

8. (削除)

9. (補正後) 前記アンテナは、平面ダイポールアンテナまたは平面スロットアンテナであり、前記ソリッドイマージョンレンズの底面上の焦点位置に配設され、前記入射光を幾何学的に共鳴させて集光し上記焦点位置に近接場として集中する、または、前記試料の上記焦点位置近傍の近接場を幾何学的に共鳴してピックアップし、上記ソリッドイマージョンレンズの媒質中に伝搬波として放射することを特徴とする、請求項7に記載の赤外光集光装置。

10. 前記平面ダイポールアンテナは、略三角形の2つの導体の頂点を、前記入射光または出射光の回折限界以下の微細距離を離して対向させたボータイアンテナであり、かつ、このボータイアンテナの差し渡し長が上記入射光または出射光の有効波長の $1/2$ であることを特徴とする、請求項9に記載の赤外光集光装置。

11. 前記平面スロットアンテナは、導体に開けられた略三角形の2つの窓の頂点を前記入射光または出射光の回折限界以下の微細距離を離して対向させたボータイアンテナであり、かつ、このボータイアンテナの差し渡し長が上記入射光または出射光の有効波長の $1/2$ の長さであることを特徴とする、請求項9に記載の赤外光集光装置。

12. (補正後) 入射光を入力するまたは出射光を出力する、赤外光領域又はマイクロ波帯域で大きな屈折率を有するソリッドイマージョンレンズと、このソリッドイマージョンレンズの底面に配設したアンテナと、このアンテナに近接して配設した試料を保持するアームと、このアームの位置を制御するXYZ-3軸メカニカルステージとを有し、

上記XYZ-3軸メカニカルステージを操作して、上記アームに保持した試料の所望の位置に上記入射光を近接場として集中する、または、上記試料の所望の位置からの近接場を伝搬波に変換して上記ソリッドイマージョンレンズから上記出射光として出力することを特徴とする、赤外光集光装置。

13. (削除)

14. (削除)

15. (追加) 前記アンテナは、平面ダイポールアンテナまたは平面スロットアンテナであり、前記ソリッドイマージョンレンズの底面上の焦点位置に配設され、前記入射光を幾何学的に共鳴させて集光し上記焦点位置に近接場として

集中する、または、前記試料の上記焦点位置近傍の近接場を幾何学的に共鳴してピックアップし、上記ソリッドイマージョンレンズの媒質中に伝搬波として放射することを特徴とする、請求項12に記載の赤外光集光装置。

16. (追加) 前記平面ダイポールアンテナは、略三角形の2つの導体の頂点を、前記入射光または出射光の回折限界以下の微細距離を離して対向させたボータアンテナであり、かつ、このボータアンテナの差し渡し長が上記入射光または出射光の有効波長の $1/2$ であることを特徴とする、請求項15に記載の赤外光集光装置。

17. (追加) 前記平面スロットアンテナは、導体に開けられた略三角形の2つの窓の頂点を前記入射光または出射光の回折限界以下の微細距離を離して対向させたボータアンテナであり、かつ、このボータアンテナの差し渡し長が上記入射光または出射光の有効波長の $1/2$ であることを特徴とする、請求項15に記載の赤外光集光装置。

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